

A NEW FROG OF THE GENUS *RANA*
FROM THE PHILIPPINES

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Inger (1958) separated *Rana magna* of the Philippines as a full species, from *Rana macrodon* of Borneo and other East Indies areas. In 1966, (p. 214) he similarly gave species status to *R. leytenensis*, separating it from *R. microdisca*. This judgment, raising these taxons from subspecific to specific status, took into consideration the numerous morphological differences and inferred that interbreeding would not occur should they become sympatric at any point. These changes recognized a total of 13 species of the genus *Rana* as occurring in the Philippines, compared to 16 species known from Borneo. Only six species (*R. cancrivora*, *R. enythraea*, *R. limnocharis*, *R. microdisca*, *R. nicobarensis* and *R. signata*) were recognized by Inger (1966) as occurring in both areas. The new Philippine frog is treated in the same light as *R. magna* and *R. leytenensis*, and is recognized as an endemic Philippine species which appears to have its closest affinities with *Rana kuhli*. The range of the latter includes Borneo and Celebes in the Indo-Australian archipelago and southeast Asia.

Material and measurements.—During our 1971 expedition to northeastern Mindanao, a series of a dozen specimens (including six adults) were collected on rocks in the Tagibo River or in the water, at an elevation of about a thousand meters, on the slopes of Mt. Hilong-hilong. The river at this point is bordered by transitional dipterocarp-submontane forest.

Measurements of preserved specimens were made to the nearest 0.1 mm using a Helios dial caliper. Snout-vent length was measured from the tip of the snout to the vent with the specimen ventral side down on a flat surface; the tibia was measured as the length of the bone in the lower leg; the head length as the distance from the tip of the snout to the posterior edge of the tympanum; head breadth at the widest point, the angle of the jaws; snout length from the anterior edge of the orbit to the tip of the snout; third finger length from the tip to the base of the second (proximal) subarticular tubercle; and first and fourth finger lengths from the tip to the base of the subarticular tubercle. Other measurements (diameter of eye, tympanum, and digital disks) are not subject to much variation in method.

Rana diuata, new species
Figs. 1-3

Holotype.—California Academy of Sciences registry number 133500, an adult female, collected on the Tagibo River, south side of Mt. Hilong-hilong.

altitude 1,000+ meters, Diuata Mountains, Cabadbaran, Agusan del Norte Province, Mindanao Island, Philippines, on May 18, 1971, by Lawton Alcala and party.

Paratypes.—California Academy of Sciences 133430–133432, 133434, 139389–139393; Museum of Comparative Zoology 88036; British Museum (Natural History) 1974.2326; and Field Museum of Natural History 197934, from the same locality as the type.

Diagnosis.—The following combination of characters distinguishes this species from its nearest relative, *Rana kuhli*, as well as other Philippine species with which it might be confused. A moderate-size *Rana*, snout-vent length about 37 to 63 mm for mature specimens; habitus stocky; head broader than long; snout round-pointed, strongly projecting in profile (Fig. 3); limbs rather short, tibia about 45 to 50% of snout-vent length and 110 to 126% of breadth of head; diameter of disk of third toe 73 to 88% of diameter of tympanum; first and second fingers about equal when adpressed, or in some cases first slightly longer; toes webbed beyond base of disk except for fourth which is webbed to disk; dorsal color (in preservative) black or deep, blackish brown, densely covered with minute, white-tipped tubercles and scattered, slightly larger white tubercles, the latter primarily located posterior to eyes and at center of wartlike swellings which are most numerous in the dorsolateral regions; venter rather heavily pigmented with slate-brown, forming blotches on belly, more uniform beneath head and throat.

Description and variation.—A moderate-sized *Rana*, snout-vent length for 4 males 37.4 to 57.7 mm and for 2 females 62.5 to 63.1 mm (a female measuring 39.9 mm is immature); habitus stocky, short limbs; head slightly broader than long, its length 93 to 96% of breadth for 6 adult specimens, snout strongly projecting in profile, round pointed or rarely narrowly truncate as seen dorsally, its length 35 to 41% of head breadth in 9 examples, canthus rostralis rounded; lores slightly oblique and concave, diameter of eye 30 to 35% of head breadth and 80 to 89% of snout length; tympanum distinct, its diameter about 38 to 50% of eye diameter; supratympanic fold rather broad; vomerine tooth patches prominent, oblique, posterior and mesial to choanae; tongue with a deep, rounded notch posteriorly; males with vocal sacks; fingers without webs, tips slightly swollen into rounded knobs; first and second fingers about equal when adpressed, or first very slightly longer; both shorter than fourth (Fig. 1a); length of second finger, as measured to base of subarticular tubercle, 84 to 90% of length of first (similarly measured) and 78 to 84% of length of the third measured to base of proximal tubercle; subarticular tubercles large, rounded, not sharply protruding; no supernumary palmar tubercles (Fig. 1a); hind limbs of moderate length; length of tibia 45 to 50% of snout-vent length; toes fully webbed, webs usually reaching beyond proximal edge of disk on all toes but fourth;

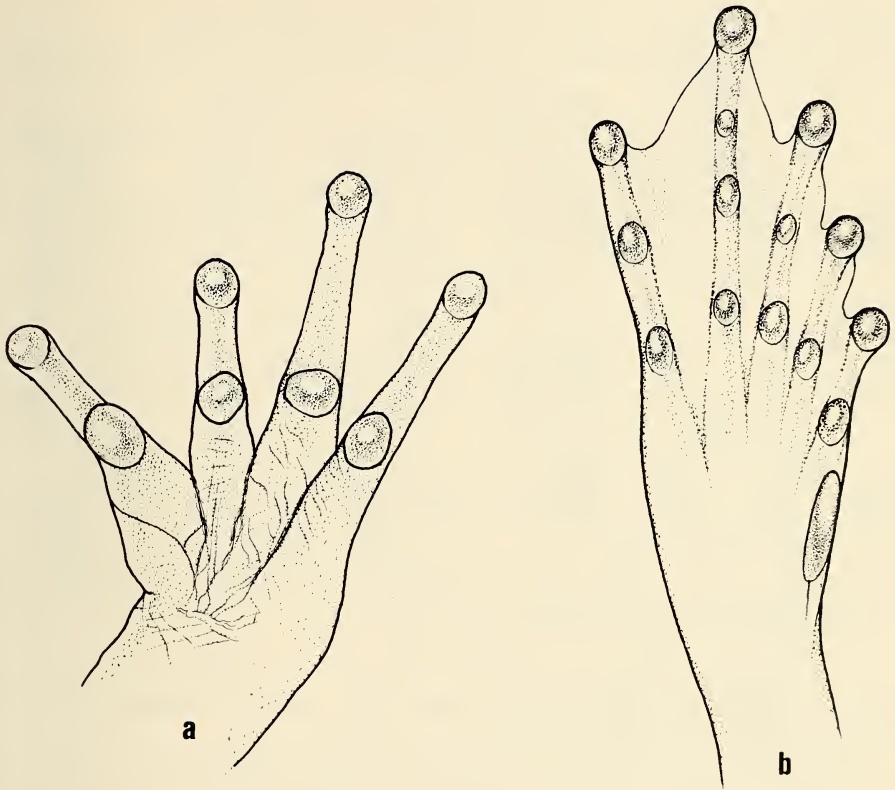


Fig. 1. *Rana diuata*: a, Palmar view of hand; b, Plantar view of foot.

tips of toes dilated into depressed disks without circummarginal groove (Fig. 1b); diameter of disk of third toe about 73 to 88% of diameter of tympanum for 9 specimens (see also Table 1); no supernumary plantar tubercles; inner metatarsal tubercle low, long and narrow, no outer tubercle; a flap of skin on outer margin of tarsus and fifth toe; skin of dorsum, upper lateral surfaces and limbs with numerous, minute, white-tipped tubercles and with wartlike swellings most abundant in the dorsolateral areas, anal region with white tipped tubercles; distal, posterior thighs and ventral surface relatively smooth; ova with one hemisphere deeply pigmented as for *R. magna*, *R. leytensis*, and *R. woodworthi* (Inger, 1958, Alcalá, 1962).

Color (in preservative).—Dorsal surfaces of adults relatively uniform blackish brown to blackish with minute white tipped tubercles (some juveniles with a faint barred pattern on limbs); posterior thighs dark brown; upper jaw relatively uniform dark or with lighter blotches on edge; lower jaw with narrow, light, irregular transverse bars, belly mod-

Table 1. Size at maturity and pertinent proportional differences for *Rana magna*, *R. kuhli*, and *R. diuata* (R = range, M = mean, N = number in sample).

	Snout-vent length at maturity (mm)		Breadth of 3rd toe disk	Tibia length	Diameter of eye	Snout length
	Male	Female	Diameter of tympanum	Snout-vent length	Snout length	Head breadth
<i>Rana magna</i>	90.6-	80.2-	M = 0.465	M = 0.527	M = 0.876	M = 0.392
	108.5	93.6*	R = 0.341-	R = 0.483-	R = 0.800-	R = 0.365-
	N = 2	N = 3	0.565	0.567	1.00	0.414
			N = 6	N = 9	N = 9	N = 9
<i>Rana diuata</i>	37.4-	62.5-	M = 0.786	M = 0.480	M = 0.852	M = 0.376
	57.7	63.1	R = 0.727-	R = 0.455-	R = 0.800-	R = 0.355-
	N = 4	N = 2	0.880	0.500	0.885	0.406
			N = 10	N = 10	N = 10	N = 10
<i>Rana kuhli</i>	43.9-	50.7	(Tympanum hidden)	M = 0.458	M = 0.971	M = 0.327
	74.3	67.4		R = 0.422-	R = 0.905-	R = 0.307-
	N = 13	N = 15		0.481	1.09	0.351
			N = 15	N = 15	N = 15	N = 15

* A female at 67 mm is immature.

erately or deeply pigmented with slate-brown blotches; throat and head region usually dark slate-brown.

Measurements of holotype (mm).—Snout-vent length 63.1; length of head 23.5; breadth of head 24.8; length of snout 8.8; diameter of eye 7.6; diameter of tympanum 3.0; interorbital breadth 4.6; length of third finger 9.8; length of second finger 7.0; length of first finger 8.1; diameter of fourth toe disk 2.5; length of tibia 30.3; length of hind limb 93.5.

Ecological note.—One specimen was collected in the water and the others on rocks in the Tagibo River, a gradient stream, in an area of dipterocarp forest, at an altitude of about 1,000 meters.

Range.—Known only from the type locality in northeastern Mindanao. Although we have conducted extensive surveys on western Mindanao and the nearby islands of Camiguin, Bohol, Cebu, Siquijor and Negros, this species has not been taken in these localities. Its possible occurrence on Dinagat, Samar, or Leyte remains to be determined.

Etymology.—The name "*diuata*" is that of the mountain range in eastern Mindanao where the frog was discovered.

Comparison with other species.—*Rana diuata* is distinguished from *Rana magna*, the sympatric population with which it might be confused, by its smaller size; darker, more uniform dorsal coloration; more rugose skin on the anterior dorsal surfaces; shorter first finger, about equal to the sec-

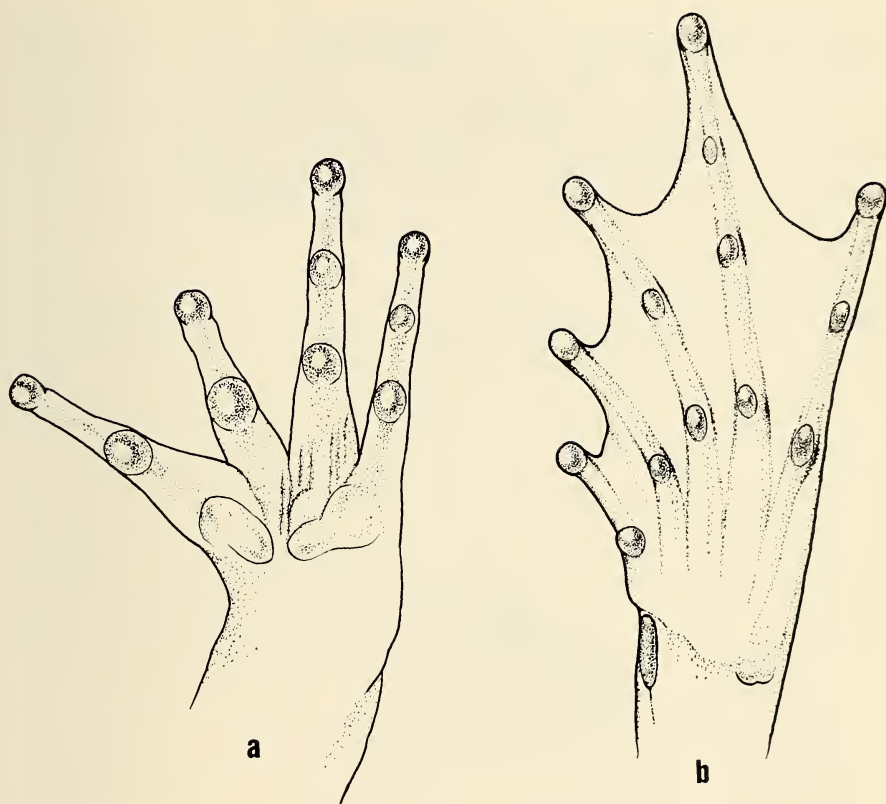


Fig. 2. *Rana magna*: a, Palmar view of hand; b, Plantar view of foot.

ond when fingers are adpressed (not distinctly longer than); somewhat more dilated toe disks (Figs. 1 and 2) and shorter tibia relative to the snout-vent length (see Table 1). From *Rana woodworthi* which occurs on Luzon and Polillo Islands, it can be distinguished by its very much darker and much more uniform coloration; slightly less expanded finger tips; and much more tuberculate skin (*R. woodworthi* is relatively smooth); shorter first finger, about equal to the second when adpressed (not longer than); and the absence of a dorsolateral fold which is prominent for *R. woodworthi*. This species in habitus, size, and general dorsal color pattern, webbing, tuberculation and habitat preference is most like *R. kuhli* from Borneo and southeast Asia. It differs in a number of characteristics: the distinct (not hidden) tympanum (Fig. 3), the longer snout as evidenced by the ratio of snout length to head length and the diameter of eye to snout length (Table 1), the more pointed snout when viewed dorsally, and the darker ventral color.

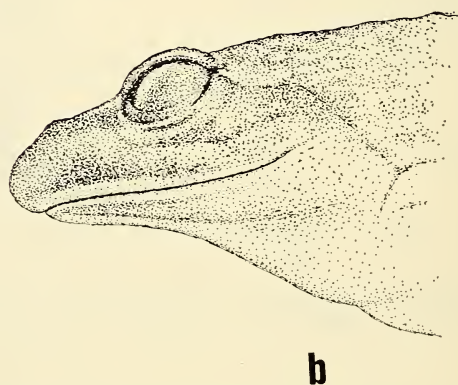
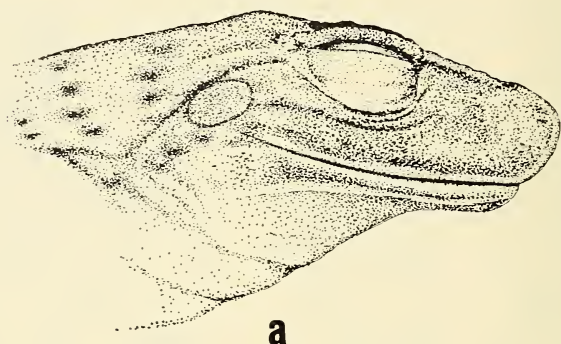


Fig. 3. Head of: a, *Rana diuata*; b, *Rana kuhli*.

Detailed descriptions of *R. magna*, *R. woodworthi* and *R. kuhli* are available in recent publications (Inger, 1954, 1958, and 1966).

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